



Prolegomena to a theory of X-marking

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Abstract

The morphological marking that distinguishes conditionals that are called “counterfactual” from those that are not, can also be found in other modal constructions, such as in the expression of wishes and oughts. We propose to call it “X-marking”. In this article, we lay out desiderata for a successful theory of X-marking and make some initial informal observations. Much remains to be done.

Keywords Conditionals · Counterfactuality · Fake tense · Subjunctive · Desire ascriptions · Necessity · Modality

1 The study of X-marking introduced

Two kinds of circumstances in which one might want to make a conditional claim are:

1. when the antecedent proposition is epistemically possible (“open”) and one wants to convey that the consequent follows from the antecedent,
2. when the antecedent proposition is known to be false (“counterfactual”) and one wants to convey that the consequent would have followed from the antecedent had it been true.

The linguistic expressions of open conditionals and counterfactual conditionals are typically distinct. For example, in English one would use the following pair of sentences in the two relevant circumstances:

We have worked individually and collaboratively on some of the questions discussed in this article for a long time and thus it’s impossible to list the valuable input and feedback we’ve received over the years. We thank all of our audiences and colleagues for their help. We also thank two anonymous reviewers for L&P for their incisive and useful feedback, as well as the editors Patrick Grosz and Regine Eckardt for their shepherding.

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- (1) a. If Miranda knows the answer, Emily knows the answer.
 b. If Miranda knew the answer, Emily would know the answer.

The morphology in English of the conditional in (1b) differs from the morphology in (1a) in several ways: an extra layer of past tense in both clauses of (1b) and the presence of the modal underlying the expression *would* in the consequent.

There are at least two terms that have been used in the literature to refer to this morphosyntactic marking: “counterfactual” and “subjunctive”. The former is more common in linguistics, the latter in philosophy and logic. However, both terms are problematic.¹

1.1 Not necessarily counterfactual

While the marking employed in (1b) is the form one would use in situations where the antecedent is counterfactual, it can also be used in other situations, so it cannot be said to encode counterfactuality. Sentences that have the same morphological make-up as (1b) but differ in lexical aspect, for example the following “Future Less Vivid” (FLV) conditional, do not give rise to a counterfactual inference:

- (2) If you took the 5 pm train, you would get there by midnight.

One can’t conclude from (2) that you will not take the 5 pm train and that you will not get there by midnight.

There are other examples of non-counterfactual “counterfactuals”, such as the famous case from Anderson (1951):

- (3) If Jones had taken arsenic, he would have shown just exactly those symptoms which he does in fact show.

Clearly (3) can be uttered by someone who believes that Jones has taken arsenic, thus does not believe that the antecedent is counterfactual.²

In addition, the morphosyntax in question has additional uses outside of conditionals that we will discuss in Part II of this article and that do not support a counterfactual semantics for the marking.

So, we shouldn’t call the morphosyntax “counterfactual marking”.

1.2 Not necessarily subjunctive

Neither should we call the morphosyntax “subjunctive marking”, since the subjunctive mood is neither necessary nor sufficient for such conditionals (Iatridou, 2000, 2021).

¹ In fact, it is intriguing that each community seems to prefer a term that is a technical term in the other.

² Virtually the same example appears in Karttunen and Peters (1979: ex. (4), p.6) without reference to Anderson’s article.

Some languages (Dutch for sure, and arguably³ English) simply do not have a subjunctive mood but can still construct conditionals of this sort. That subjunctive mood is not necessary can be seen even in languages that otherwise do have a subjunctive like French. French has a subjunctive, for example in the complement of the verb “doubt”:⁴

- (4) Marie avait un parapluie rouge hier.
 Marie have.PST.IND a umbrella red yesterday
 ‘Marie had a red umbrella yesterday.’
- (5) Je doute que Marie {ait | *a | *avait}
 I doubt that Marie {have.SUBJ | have.PRS.IND | have.PST.IND}
 un parapluie rouge hier.
 a umbrella red yesterday
 ‘I doubt that Marie had a red umbrella yesterday.’

But the subjunctive is not used in sentences like (1b)/(2)/(3):

- (6) Si Marie {avait | *ait} un parapluie rouge, il
 if Marie {have.PST.IND | have.SUBJ} a umbrella red, he
 {l’aurait | *ait} vu.
 {it have.COND | have.SUBJ} seen
 ‘If Marie had a red umbrella, he would have seen it.’

Instead of the subjunctive, in the antecedent we see a past indicative, and in the consequent, we see the “conditionnel”, a combination of future + past + imperfective (Iatridou, 2000). Iatridou (2000) argued that subjunctive appears in the relevant conditionals only if there is a paradigm for the past subjunctive. French does not have past subjunctive anymore, so the marking in the antecedent consists of past indicative (and imperfective, as we will see). In previous stages of French, where there was still a past subjunctive, this would appear in the marking of the antecedent in counterfactual conditionals. In sum, the subjunctive is not necessary for the expression of counterfactuality.

That the subjunctive is not sufficient for the expression of counterfactuality can be seen in Icelandic, where it appears under I-to-C movement necessarily, without any “counterfactual inference” (Iatridou & Embick, 1993; Iatridou, 2021):

³ For some speakers, English retains the form *were* (instead of *was*) in antecedents of conditionals:

(i) If I were a rich man, ...

One might argue that (at least this variety of) English has a subjunctive but that its form has collapsed with the indicative in all but this small corner of the grammar.

We might add that Stowell (2008) describes a variety of English with a form that he suggests is a subjunctive and that he dubs the “Konjunktiv II”, in homage to its more well-known German cousin:

(ii) If she *had’ve* frozen it, she’d’ve blackmailed the Marshall’s for it’s return.

⁴ Our glossing of non-English examples will be minimal, as a rule highlighting only morphological components relevant to X-marking.

- (7) a. Ef hann hefur farið, kem ég.
if he has.PRS.IND gone, come I
'If he has left, I will come.'
- b. Hafi hann farið, kem ég.
has.PRS.SUBJ he gone come I
'If he has left, I will come.'
- c. *Ef hann hafi farið...
if he has.PRS.SUBJ gone
- d. *Hefur hann farið...
has.PRS.IND he gone

Both (7a) and (7b) are non-counterfactual, non-FLV conditionals.⁵ (7a) with the verb in situ has indicative mood, while (7b) with the verb in first position is subjunctive, with no concomitant change of meaning with regards to counterfactuality. (7c,d) show that the mood switch is necessary and entirely conditioned by the position of the verb. In counterfactual conditionals, what appears in Icelandic is the *past* subjunctive.⁶

So the subjunctive appears in a proper subset of the cases where counterfactual marking involves past tense, namely in those languages that make temporal distinctions in their subjunctive and have a paradigm for past subjunctive.

1.3 X-marking

Since neither the term “counterfactual conditional” nor “subjunctive conditional” will do, we propose that we need new terminology, which will have the advantage of not suggesting (right or wrong) associations. We propose to use the term “O-marked conditional” (where “O” can stand for *open*, *ordinary*, or whatever other mnemonic the reader prefers) for (1a). We propose to use the term “X-marked conditional” (where “X” can stand for *eXtra*, or whatever other mnemonic the reader prefers) for (1b)/(2)/(3).

Languages can use different forms of X-marking in the antecedent and consequent of X-marked conditionals. We see this above in English and in French. Some languages do not have distinct markings: German for example uses its past subjunctive in both clauses. Whenever relevant, we will distinguish between “antecedent X-marking” and “consequent X-marking”.

1.4 The project

We believe that X-marking is a useful heuristic category for linguistic investigation. For each individual language, one would begin with this question: What are the ways

⁵ We have not been able to establish a difference in meaning between the two forms.

⁶ A relevant example, provided to us by Einar Sigurðsson (p.c.):

- (i) Ef Arnkatla myndi svarið, myndi Flóki hana líka
if Arnkatla remembered.PST.SUBJ the.answer remembered.PST.SUBJ Flóki it too
'If Arnkatla remembered the answer, Flóki would remember it too.'

in which conditionals about counterfactual scenarios differ from those about epistemically open scenarios? As proposed here, let's call the distinctive marking used for counterfactual conditionals X-marking.

A number of follow-up questions should then be explored for each specific language:

- Is X-marking also used in Anderson conditionals (and similar cases) and FLVs? If so, one can probably conclude that it isn't strictly counterfactual marking.
- Is there X-marking both in antecedent and consequent? If so, are the exponents distinct?
- If X-marking is complex, what are the components of X-marking? Do the components have other uses in the language, separately or in combination?
- Does X-marking have uses outside conditionals? As we will see, there are environments where X-marking appears in several languages: the distinction between wants and wishes, the distinctions between musts and oughts, the distinctions between mays and mights, and a choice between O-marking and X-marking in combination with approximatives like *almost*.

Once these basically descriptive, empirical questions have been answered, one can proceed to attempting a language-specific analysis of X-marking. What is the meaning that X-marking contributes in conditionals? Can this be specified in a unified way with any other uses of X-marking? If X-marking is complex, what do the individual components contribute to the meaning of X-marking? Is the meaning that a particular component contributes to X-marking the same meaning that it contributes when it occurs elsewhere in the language, on its own or with other components, perhaps distinct from its "partners" in X-marking?

Like with any marking that is correlated with a semantic contribution, we can ask whether X-marking (or any particular part of it) is effective or reflective. By that we mean whether X (or part of X) makes a direct contribution to compositional semantics or whether it merely reflects that something somewhere else in the composition is semantically active. Similar issues arise in the analysis of tense (some tense-marking may simply reflect higher temporal operators, a.k.a. "sequence of tense"), of negation (e.g. in "negative concord"), and in other areas of grammar. In the case of X-marking, the question arises twice: for "consequent" X-marking and "antecedent" X-marking.

There are also some questions about the morphosyntactic make-up of O-marked conditionals. In particular, is there an encoded meaning of O-marking that competes with the meaning of X-marking? Or is O-marking simply what happens when X-marking is absent?

We prefer methodologically to work with a starting hypothesis of total uniformity: all languages have X-marking, in all languages X-marking has the same overall meaning in all its uses (not just in conditionals), in all languages where X-marking is made up from more than one component, those components have the same meaning when they are used elsewhere, on their own and in combination with elements other than those they combine with in X-marking. In the ideal case, the morphosyntactic category of X-marking corresponds to a unique and uniform notional category⁷, both

⁷ Our use of the notion of a "notional category" is of course in homage to Kratzer (1981).

internal to a specific language and cross-linguistically; in other words, X-marking has a uniform meaning universally. None of this is likely to be the case, certainly not in full generality, of course, but it is a productive methodology. Only careful language-specific investigations coupled with empirically grounded cross-linguistic comparison and generalization will show whether the initial hypothesis of total uniformity can be maintained. We will propose an informal statement of a candidate uniform meaning for X-marking, but we will leave any attempt at solidifying or refuting the proposal to future work.⁸

The article has two parts. In Part 1, we focus on X-marking in conditionals and closely related cases. We will survey some of the forms X-marking can take and discuss some approaches to the question of the distinctive meaning that X-marking contributes in conditionals. In Part 2, we explore two very common uses of X-marking outside of conditionals and discuss the consequences of these uses for the prospects for a unified meaning of X-marking. Our aims remain modest and we do not provide a worked out formal analysis. We conclude with a to-do list. The overall goal of the article is to lay out an agenda for the continued study of X-marking cross-linguistically.

Part I: X-marking in conditionals

2 The form

Languages can be divided into two groups: those that have dedicated X-marking, and those where the exponents for X-marking appear to have other functions as well.

Hungarian⁹ is a language with dedicated X-morphology: the morpheme *-nA* is added to an O-conditional, and *-nA* does not appear to have any other use in the language. Our pair in (1,a,b) appears as (8)/(9) in Hungarian, where (9) differs from (8) only in the presence of *-nA*. Moreover, what we see is that in Hungarian, there is no difference between antecedent-X-marking and consequent-X-marking.

- (8) Ha János tudja a választ, Mari is tudja a választ.
 if János knows the answer Mari too knows the answer
 ‘If János knows the answer, Mari knows the answer (too).’
- (9) Ha János tudná a választ, Mari is tudná a választ.
 if János know-*nA* the answer Mari too know-*nA* the answer
 If János knew the answer, Mari would know the answer.

Like (1b), (9) is a “present X-marked conditional” (presX): both *p* and *q* are about the time of utterance.

⁸ We thank a reviewer for prompting this clarification of our starting assumptions. The methodology we adopt is recommended by Matthewson (2001) and Bochnak (2013). [Added in proof:] Since writing this, we have indeed started to work on solidifying or refuting the proposal. In a manuscript in progress with the provisional title “If wishes were horses: What desire ascriptions have to do with conditionals”, we uncover some ways in which X-marking has slightly different effects in different languages.

⁹ All of the Hungarian data in this article are due to Dóra Kata Takács (p.c.).

There are also past X-marked conditionals (pastX), where p, q are about a time prior to the utterance time. Again, Hungarian is transparent here: the verbs take past tense morphology and on top of that, on a light verb¹⁰, comes *-nA*. Compare the presX in (9) with the pastX in (10):

- (10) Ha János tudta volna a választ, Mari is tudta volna
 if János know.PST be-*nA* the answer Mari too know.PAST be-*nA*
 a választ.
 the answer
 'If János had known the answer, Mari would have known the answer too.'

Finally, Future Less Vivids (see Sect. 3.5) also contain the X-morpheme of Hungarian. The difference between a presX and a FLV is a function of the lexical aspect of the predicates involved (Iatridou, 2000) and so we would expect an FLV to look morphologically like a presX in terms of its tense and (viewpoint) aspect morphology, which it does also in Hungarian. Compare the FLV in (11b), with the O-marked future-oriented conditional in (11a). The two differ only in the presence of *-nA* in (11b):

- (11) a. ha holnap el-indul, a jövő hétre oda-ér.
 if tomorrow away-leave the following week.onto there-reach
 'If he leaves tomorrow, he will get there next week.'
 b. ha holnap el-indulna, a jövő hétre oda-érne.
 if tomorrow away-leave-*nA* the following week.onto there-reach-*nA*
 'If he left tomorrow, he would get there next week.'

So for Hungarian, the task ahead would appear to be straightforward: find the difference in meaning between O-marked and X-marked conditionals and attribute that meaning to *-nA*.¹¹

The project becomes much more complicated with languages where the exponents associated with X-marking play different roles in other environments. Such languages variably use past tense, imperfective, future and/or subjunctive to mark the difference between X- and O-marked conditionals.

For example, Greek uses past and imperfective in the X-marked antecedent. The hypothetical events described in (12) (from Iatridou, 2000) are not interpreted in the past, as one would expect from the presence of the past tense, nor as being in progress or habitual, as one would expect from the presence of the imperfective. The (complete) burial would happen after the chief has (completely) died, a perfective description, rather than when he is in the process of dying:

¹⁰ The presence of the light verb/auxiliary merits a remark: many languages have the property of being able to carry only one morpheme on the verb, and the presence of an additional morpheme requires the addition of a light verb. This pattern can be seen very clearly in e.g. Hindi, a language completely unrelated to Hungarian.

¹¹ As a reviewer points out, even the Hungarian case may not be *entirely* straightforward: there are two occurrences of the X-marking morpheme.

- (12) An o archigos pethene avrio, tha ton thavame eki.
 If the chief died.PST.IMP tomorrow, FUT him bury.PST.IMP there
 ‘If the chief died tomorrow, we would bury him there.’

Yet, the morphology is past and imperfective and obligatorily so. For this reason, the relevant morphemes are sometimes referred to as “fake” (following Iatridou (2000)), regardless of the analysis of this phenomenon. So, Greek antecedent X-marking consists of fake past and fake imperfective.¹² Consequent X-marking in Greek consists of fake past, fake imperfective and the future marker (a combination very similar to the Romance “conditional mood” we already mentioned earlier; see again Iatridou (2000) for details).

English, among many others, is also a fake past language. That is, its antecedent X-marking consists of past, as can be seen in (13a,b) where the past morpheme in the antecedent clearly does not yield past event descriptions. To get a pastX, one more level of past is needed for the actual temporal backshifting, as seen in (13c). Among the languages we discuss here, English is in a minority where antecedent X-marking appears to consist only of past tense.

Consequent X-marking in the examples below consists of past tense and the modal *woll*^{13, 14}:

- (13) a. If you took the 5 pm train, you would get there by midnight. (FLV)
 b. If I had a car now, I would be happy. (presX)
 c. If he had been descended from Napoleon, he would have been shorter. (pastX)

The literature identifies many other languages whose X-marking strategy employs morphemes that have apparently different uses in other environments.¹⁵ As we’ve said, here the challenge is much harder than in Hungarian. It is not sufficient to find the difference in meaning between O- and X-marked conditionals and hardcode it as the meaning of the relevant morpheme(s). What is required is to understand what the

¹² But it should be noted that fake imperfective is not a “perfective in disguise”. The imperfective form is a necessary ingredient of Greek X-marking but this form can also be interpreted as in progress:

- (i) An dhiavazes Dostoyevsky tin ora pu tha bi, tha endiposiazotan
 if read.PST.IMP Dostoyevsky the time that FUT enters, FUT be.impressed.PST.IMP
 ‘If you were reading Dostoyevsky when s/he comes, s/he would be impressed.’

Of course, with progressive interpretations, it is harder to show the “fakeness” of the imperfective, as that is the form one would expect anyway.

¹³ We adopt here the assumption that *would* is *woll* + past, as first used by Abusch (1988) and Ogihara (1989: p.32). Abusch (1997: fn.14, p.22) attributes the coinage of *woll* to Mats Rooth in class lectures at UT Austin.

¹⁴ English X-marked conditionals can also contain other modals like *might* and, for some speakers at least, *was going to* (Halpert, 2011).

¹⁵ For the record, the relevant literature includes at least the following: (Iatridou, 2000; Nevins, 2002; Ippolito, 2003, 2013; Legate, 2003; Arregui, 2005, 2007; Schlenker, 2005; Han, 2006; Anand & Hacquard, 2010; Bittner, 2011; Halpert, 2011; Halpert & Karawani, 2012; Karawani & Zeijlstra, 2013; Schulz, 2014; Ogihara, 2014; Romero, 2014; Karawani, 2014; Ferreira, 2016; Bjorkman & Halpert, 2017; von Prince, 2019; Mackay, 2019).

meaning of the morpheme(s) is so that the non-X-marking uses are also explained. For example, in Greek, one would have to give a meaning for the past tense and imperfective morphemes so that sometimes they yield the meaning of X-marking, and sometimes they yield past progressive (or past habitual) event descriptions.

Most proposals in the literature that attempt to work towards a compositional analysis of X-marking concentrate on the role of (fake) past tense alone in the role of X-marking, ignoring other elements in X-marking, like imperfective aspect in Greek, Romance etc. This would have made sense if all languages had been like English, where (antecedent-) X-marking consists only of fake past. But as we already said, a great number of languages have additional morphological exponents in their X-marking. As we have seen, Greek (as well as the Romance languages and others) also has fake imperfective.¹⁶ If X-marking consists of past and imperfective in Greek and just past in English, one would have to come to either one of two conclusions about $[\text{past}]_{G(\text{reek})}$ and $[\text{past}]_{E(\text{nglish})}$:

- a. Since $[\text{past}]_G$ needs help from the imperfective for X-marking and $[\text{past}]_E$ does not, the past morphemes in the two languages make different semantic contributions:
 $[\text{past}]_G \neq [\text{past}]_E$
 or
- b. The past morphemes in the two languages do make the same contributions
 $[\text{past}]_G = [\text{past}]_E$
 and the obligatory imperfective in Greek X-marking makes no semantic contribution but has to be there for language-specific morphological rules¹⁷.

Either conclusion has gone mostly under-appreciated by work that focuses only on the role of past in X-marking. But one has to be conscious of the fact that one of these conclusions seems unavoidable if one gives the job of X-marking to the past morpheme alone. One should not assign a meaning to fake past alone without addressing this consequence.

In this article, however, we will not even try to disassemble the meaning of X-marking where it is complex. We will be concerned only with its overall meaning contribution.

3 X-marking in conditionals as domain widening

We start with an intuition about the meaning of X-marking in conditionals, while keeping in mind that the goal will ultimately be to find a unified meaning for all uses

¹⁶ Lest the reader think that English has no fake imperfective simply because it has no imperfective at all, we would like to point out that the question of the distribution of fake imperfective is more complex than that. For example, Russian, among other Slavic languages, has a fake past but no fake imperfective in the most standard X-marked conditionals. Yet, Russian is known for its many imperfectives. (The pointer to “standard X-marked conditionals” is because Grønn (2013) shows that there is a certain register used in annotations of chess games, in which Russian behaves like Greek and French, with its X-marking consisting of fake past and fake imperfective, instead of fake past and subjunctive *by* as in standard Russian X. See Iatridou & Tatevosov (2015) for a critique of Grønn’s analysis of “Chess Russian”.)

¹⁷ This was, in fact, the position taken for Greek imperfective in Iatridou (2000).

of X-marking that are on our agenda (we look at non-conditional uses of X-marking in Part II of the article). The intuition we explore is one that is common to many theories of X-marking.

3.1 Modal domain widening

The core of the insight was developed by Stalnaker within his account of conditionals (Stalnaker, 1968, 1975, recently lucidly re-explicated in Stalnaker, 2014). The strategy he advocates is very much congenial to our modest goals in this article: identify a meaning for X-marking without looking at its morphosyntactic composition or realization.¹⁸ Stalnaker's answer to the question of what X-marking means is this: "I take it that the subjunctive mood in English and some other languages is a conventional device for indicating that presuppositions are being suspended" (Stalnaker, 1975: p. 276).

What does this mean? The idea is that O-marked conditionals operate within the confines of the set of worlds defined by what is currently being presupposed in a conversation: the context set. X-marking signals that presuppositions are being suspended: the result is that the conditional can access worlds outside the context set.

Stalnaker himself gave a semantics for *if* p , q conditionals that is relative to a selection function f that for any evaluation world w and antecedent p selects a particular p -world, which is then claimed to be a q -world. So, his proposal for the meaning of X-marking in conditionals amounts to this:

- O-marked conditionals: the selection function f is constrained to find a p -world within the context set (the set of worlds compatible with all the presuppositions made in the context of the current conversation).
- X-marked conditionals: f may reach outside the context set.
- That is, with X-marking, we abstract away from some established facts and then run a thought experiment. We then conclude that in the selected p -worlds, even those outside the context set, the consequent is true.

Why would we want to or need to reach outside the context set? One reason is that p may be presupposed to be false: there are no p -worlds in the context set. So, in that case, X-marking is necessary. But beyond that, Stalnaker convincingly demonstrates the application of his view of X-marking to two of the recalcitrant cases of X-marked conditionals: Anderson-type cases, which we've already mentioned, and modus tollens-type cases. First, take Anderson examples:

- (14) If she had taken arsenic, she would show exactly the symptoms that she is in fact showing.

¹⁸ Stalnaker (2014: pp.175f). writes:

I am going to assume that we can identify at least paradigm cases of the contrasting categories of conditionals independently of any contentious theoretical assumptions about the grammatical marks by which we are identifying them, and then ask what work are those grammatical marks, whatever they are, doing? That is, what is the functional difference between a so-called subjunctive and a so-called indicative conditional?

Here is Stalnaker's gloss on this case:

In this case, it is clear that the presupposition that is being suspended in the derived context is the presupposition that she is showing these particular symptoms — the ones she is in fact showing. The point of the claim is to say something like this: were we in a situation in which we did not know her symptoms, and then supposed that she took arsenic, we would be in a position to predict that she would show these symptoms. (Stalnaker, 2014: pp.185)

Next, take what will call a “modus tollens” case:

- (15) There were no muddy footprints in the parlor, but if the gardener had done it, there would have been muddy footprints in the parlor, so the gardener must not have done it.

The reasoning in (15) is meant to be an argument for the falsity of the gardener doing it, so if the X-marking were a signal of counterfactuality, the conclusion of the argument would feel redundant. In other words, this is similar to the Anderson case in showing that X-marking does not encode counterfactuality. But a domain widening story is plausible. Stalnaker's diagnosis:

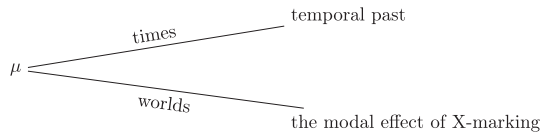
In this case, the presupposition that is suspended is the proposition, made explicit in the first premise of the argument, that there are no muddy footprints in the parlor. The idea behind the conditional claim is something like this: suppose we didn't know that there were muddy footprints in the parlor, and in that context supposed that the gardener did it. That would give us reason to predict muddy footprints, and so to conclude that if we don't find them, he didn't do it. (Stalnaker, 2014: pp.185)

We think this is a successful gloss on the meaning effect of X-marking in conditionals: X-marking signals that the conditional can reach outside the normal domain of quantification. For what follows, we will adopt the Stalnaker diagnosis of what X-marking means and recast it in the terms proposed in von Stechow (1998), which will eventually allow us to think about extending the idea to the other uses of X-marking we're concerned with. Instead of Stalnaker's selection function analysis, we will formulate our discussion in terms of restricted modality in the tradition of Kratzer (1981, 1986, 1991, 2012). Under that perspective, an *if* p , q conditional involves a modal operator that quantifies over the worlds in a certain domain (“modal base”) and that is restricted by the *if*-clause to just quantifying over the p -worlds in the modal base.

We can now formulate the following idea about the meaning contribution of O/X-marking in the case of conditionals ranging over a modal base of possible worlds:¹⁹

¹⁹ A reviewer expressed the worry that this proposal is too tightly tied to the Kratzerian restrictor view of conditionals and possible worlds semantics. But *any* successful semantics for conditionals will have a contextually supplied domain of quantification about which O/X-marking can send a signal. So, whatever merit the current view has should translate to other ways of analyzing conditionals.

Fig. 1 The duality of past according to past-as-modal approaches



- O-marking signals that the modal base is contained in the set of epistemically accessible worlds (or: the “epistemic set”).²⁰
- X-marking signals that the modal base is not entirely contained in the epistemic set.

Obviously, this is rather specific to the case of conditionals. We will soon turn to the question of whether there is any hope of extending the coverage of this diagnosis to the other cases of O/X-marking we are concerned with in this article. But first, we can situate existing theories of X-marking against the basic insight about domain widening that we just explicated.

As we’ve mentioned, existing theories of X-marking are almost exclusively focused on analyzing the contribution of “fake past” in languages that use past tense in (part of) X-marking. So, let’s look at what the past is supposed to do.

3.2 Past-as-past versus past-as-modal

Schulz (2014) coined the terms “past as modal” and “past as past” for the two kinds of proposals for what/how past tense (part or whole of X-marking) contributes to the interpretation of X-marked conditionals.²¹

In the past-as-modal view, which includes Iatridou (2000), Schulz (2014), Mackay (2019), and others, the “past” morpheme has an underspecified meaning which yields different meanings depending on whether it is “fed” times or worlds. Abstracting away from the specific proposals, one can represent this view as in Fig. 1, with μ being the morpheme in question.

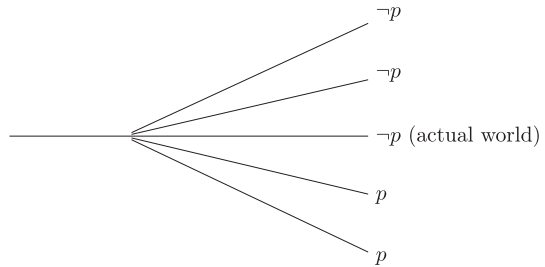
In the past-as-past view, advocated among others by Ippolito (2003, 2013), Arregui (2005, 2007), Romero (2014), Khoo (2015, 2022), X-marking (that is, the past morpheme in it) is a past operator with wide scope over the conditional, which results in the (mostly metaphysical modal’s) modal base being calculated in the past time of the utterance time. Roughly: the past takes us back to a time where the (non-past) conditional could still have been true. The picture in Fig. 2 illustrates this move to a past splitting point.

In other words, for these accounts, the “fake” past that we see in X-marked conditionals is an actual occurrence of an honest-to-goodness past morpheme with scope

²⁰ Note that we are moving to an epistemic version here, rather than the context-set based one from Stalnaker. We are indebted to the discussion in Mackay (2019), where cogent arguments against the context set version are given. For the record, von Fintel (1998) explicitly says that for the purposes there, it didn’t matter whether one used the context set or the epistemic set. NB: Mackay (2019) does not adopt an epistemic view but a restriction to the factually true propositions in the common ground. A comparison will have to wait for a future occasion.

²¹ An alternative terminology is “modal past” and “temporal past”, adopted for example by Khoo (2022).

Fig. 2 The past splitting point



above the conditional (or the modal operator that underlies the conditional, under a Kratzerian perspective).

3.3 The two views of X-past and domain widening

How do these two views relate to the Stalnakerian domain-widening idea?²²

The “past-as-past” analysis delivers domain widening through the fact that certain modal accessibility relations or modal bases narrow as time progresses: more and more metaphysically possible futures become impossible as facts in the world develop. And in the epistemic dimension: the more we learn or the more evidence becomes available, the fewer worlds are epistemically possible. Therefore, treating the past component of X-marking as moving the time of the modal operator that underlies the conditional construction into the past of the evaluation time will result in a domain that is wider than it would have been at the evaluation time. We note that there are at least two kinds of cases of X-marked conditionals that may fall under domain widening but that are harder to analyze as being due to a past time of evaluation:

- (16) a. If there had been no big bang, we wouldn’t be here.
- b. If Monica came to the party tonight, we’d have caipirinhas.

It’s not entirely clear that someone who endorses (16a) is thereby committed to the claim that there was a time in the past (before the big bang?) at which it was open whether there would be a big bang.²³ And FLVs such as (16b) do not clearly involve widening via a past evaluation time either: given that FLVs talk about still open possibilities, going back in time would not seem to serve a clear purpose (for more on the puzzle of FLVs, see Sect. 3.5).

What about the “past-as-modal” views? Here, there is a split. Iatridou (2000) proposed an “exclusion” semantics for X. In her account, X marks that the domain of quantification of the conditional is not wider but fully disjoint from what we have called the epistemic set. It is crucial to remember that this proposal had been made with the main aim of finding a common formulation for the ‘past tense’ morpheme, so that sometimes it is interpreted as a temporal past and sometimes it has the meaning associated with what we now call ‘X-marking’. But as a result of trying to bring the past tense interpretation of the relevant morpheme into the fold, Iatridou’s account,

²² Existing work does not always or even often explicitly make the connection to Stalnaker’s idea.

²³ Khoo (2022: pp.231f) entertains just such a way of biting the bullet.

and also the one developed more formally in Schulz (2014), do not in fact conform to the domain widening idea. One immediate effect of this is that while the domain of an O-marked conditional, the epistemic set, will contain the evaluation world, the domain of an X-marked conditional will not (since it's disjoint from the epistemic set). This aspect of these proposals has been shown to be problematic by Mackay (2015) (see also Leahy, 2018). More generally, the prediction is that X-marked conditionals will not obey the principle of Weak Centering,²⁴ which is standardly taken to be valid for both O- and X-marked conditionals in the logical and philosophical literature. Another way to see that the exclusion account for X-marking is incorrect is that it wrongly predicts that we should be able to use X-marked conditionals when the truth of the antecedent is common ground but we would like to talk about nearby non-actual antecedent worlds. But the following passage is incoherent:

- (17) #The butler did it with the ice-pick, but if the butler had done it, he would have used a dagger.

Under the exclusion account, this should be able to express the coherent thought that while in actuality the butler did it with the ice-pick, in the nearest non-actual worlds, he used a dagger. We therefore will from now on assume that the “exclusion” semantics for X is incorrect.

The other strand of “past-as-modal” views, represented for example by von Fintel (1998) and much more recently (Mackay, 2019), does conform to the domain widening view quite directly. von Fintel (1998) is basically just a reformulation and exploration of Stalnaker's proposal, while Mackay (2019) attempts to explain the use of past tense in X-marking within this general viewpoint. We find this line of thinking very promising, but there is much that remains to be worked out.

We end this part with a collection of open issues in the study of X-marking in conditionals. And after that, in the second part of the article, we turn to other uses of X-marking.

3.4 Open issues in X-marking on conditionals

While we think that the domain widening diagnosis for what X-marking does in conditionals is promising (and it seems that the field largely agrees), there are many open issues.

Compositional morpho-semantics How do languages compose the overall meaning for X-marking from the component morphology in such a way that domain widening is signaled? This is especially urgent for languages where the morphology involves several distinct components.

The interaction of antecedent and consequent X-marking How do antecedent X-marking and consequent X-marking collaborate in this process? Is either of them a

²⁴ Weak Centering says that the evaluation world is always included in the worlds the conditional ranges over. A consequence is that even an X-marked conditional is false as soon as the evaluation world is one where the antecedent is true but the consequent is false.

reflection, some kind of agreement, with what the other effects? Or are both reflections of some other operation? Or are both separately active or effective?

Locality of the meaning contribution We have formulated the basic idea of X-marking in conditionals as involving a signal about the domain of quantification, rather than, say, a more “local” property of the antecedent and consequent propositions. Alternatively, it may be feasible to “project” the signal from the component propositions. This is an idea hinted at in Iatridou (2000) and pursued to some extent by Leahy (2018) and somewhat differently by Crowley (2022).

The derivation of the counterfactual inference Domain widening is meant to cover non-counterfactual uses of X-marked conditionals (Anderson, modus tollens, FLVs). But an out-of-the-blue X-marked conditional typically is interpreted as signaling counterfactuality. Most authors say this is an implicature.²⁵ But how precisely is this implicature derived? A prominent proposal is that it is an “anti-presupposition”: O-marking presupposes that the domain is within the epistemic set, and using X-marking is interpreted as a signal that the presupposition of O-marking is not something the utterer wants to commit to. Exactly how this works differs between different proposals, see again Leahy (2018) and Crowley (2022) for discussion.²⁶

The final open issue we would like to draw attention to deserves its own subsection.

3.5 The puzzle of future less vivids

Iatridou (2000) re-introduced the term “Future Less Vivid” from grammars of Ancient Greek. The term FLV was meant as a descriptive term indicating that the future it described is less likely to come about than its polar opposite. Indeed, it looks like (18a) may be better than (18b):

- (18) a. I don’t think he will come to the party tonight. That’s too bad because if he came, he would have a good time.
 b. #I don’t think he will come to the party tonight. That’s too bad because if he comes, he will have a good time.

Iatridou argued that an FLV comes about morphologically in two ways:

1. One way is by X-marking on a non-progressive telic predicate in the antecedent, as in (19):

(19) If he took the syrup, he would get better.

(19) is necessarily interpreted as an FLV.

2. The second way of deriving an FLV is by X-marking on a stative or progressive predicate:

²⁵ This goes back at least to Karttunen and Peters (1979).

²⁶ Khoo (2022: Section 8.4, pp. 236–245) critically reviews Leahy’s proposal and then sketches a different approach. We should also note that Zakkou (2019), against the overwhelming consensus of the field, argues that X-marked conditionals in fact come with a counterfactuality presupposition.

Table 1 Future versus present evaluation of O-marked antecedents

	Time of evaluation in future	Time of evaluation at UT
Telic	+ (24)	
Stative	+ (26)	+ (25)
Progressive	+ (28)	+ (27)

(20) If he was/were drunk tomorrow, it would be embarrassing.

(21) If he was/were singing when the queen walks in next week, his mother would be very proud.

But unlike with X-marking on telic predicates, where the FLV interpretation is necessary, X-marking on a stative or progressive can also yield a presX²⁷:

(22) If he was/were drunk right now, it would be embarrassing.

(23) If he was/were singing the Marseillaise right now, he would be singing louder.

Iatridou argued that the above is the expected result from the following perspective. An O-marked conditional is evaluated at utterance time or in the future, depending on whether the antecedent contains a stative predicate, a progressive predicate or a telic predicate, as summarized in Table 1.

A non-progressive telic predicate in the antecedent has a future evaluation time necessarily:

(24) If he takes the syrup, ...

A stative or progressive can take either a future evaluation time or be evaluated at UT:

(25) If he is drunk right now, ...

(26) If he is drunk at tomorrow's meeting, ...

(27) If he is reading right now, ...

(28) If he is reading when you see him next, ...

The corresponding X-marked conditionals retain the evaluation time and become FLVs or presXs accordingly, as summarized in Table 2.

In other words, X-marking does not affect the time of evaluation of the corresponding O-marked conditional. If we understand why Table 1 works the way it does, we will also understand Table 2. In other words, which combinations of predicates and viewpoint aspect yield an FLV is indeed a question but it is in all likelihood the same

²⁷ To get a pastX, one would need X-marking and an additional past, which in English appears as a pluperfect:

(i) If he had been drunk at yesterday's meeting it would have been embarrassing.

Table 2 FLV and PresX of X-marked antecedents

	FLV	PresX
Telic	+ (19)	
Stative	+ (20)	+ (22)
Progressive	+ (21)	+ (23)

question as the one represented in Table 1. We will not pursue this issue further here but will continue with the questions that FLVs raise for the current discussion.

As said earlier, there is a general belief that FLVs are about unlikely futures. The question is how this ‘unlikelyhood’ can be captured within a unified theory of X-marking. Why would X-marking on a future-oriented antecedent yield unlikelyhood?

But the challenges do not end there. There are cases where what looks like an FLV, does not come with unlikelyhood. Here is an example:

- (29) You should take either the 5 pm train or the 11 pm train. If you took the 5 pm train, you would get there by midnight. If you took the 11 pm train, you would get there by 6am the following morning.

Neither of the two conditionals in (29) conveys unlikelyhood about either of the two trains. What does X-marking then do in these cases?

4 An expected reading

To appreciate what makes the constructions we will focus on in Part II of this article so challenging, it is useful to first consider what we expect when X-marking is combined with a modal or attitude predicate:

- (30) a. An overseas customer would *have to* pay value added tax for this coat.
 b. Ali would *want to* eat two helpings of this paella.

We have underlined the “consequent” X-marking in the two examples in (30) and italicized the modal/attitude in its scope. Notice that the intuitive meaning is one where the italicized operator is interpreted with respect to a shifted evaluation world. In other words, we hear an implicit conditional: (30a) talks about worlds where an overseas customer decides to buy the coat, and (30b) talks about worlds where Ali is here.

These cases are simply the result of what we expect, given that implicit conditional readings are often available. The presence of an *if*-clause is not required for conditional *would*. For one thing, other kinds of constituents can provide an antecedent scenario:²⁸

²⁸ Adjuncts used as supplying conditional antecedent scenarios were studied by Stump (1985). See also Fabricius-Hansen & Haug (2012) for recent work on the topic (thanks to a reviewer for the reference).

- (31) a. Without your help, I wouldn't have solved this problem.
 b. In other circumstances, I would have gladly helped you.

The relevant antecedent scenario can also be introduced in prior discourse (a phenomenon called “modal subordination”, see Roberts, 1989, 2021):

- (32) Sari might come to the party. She would tell us all about her newest invention (if she came to the party).

And there are cases where somehow the antecedent scenario has to be reconstructed from subtle clues (see Kasper, 1992 and also Schueler, 2008):

- (33) Your brother Peter wouldn't have failed the exam, (if he had taken the exam).

Our perspective on such cases is simply that X-marking continues to do the same job as it does in explicit *if*-conditionals: it marks that the modal base (of the underlying modal *would*) contains worlds outside the epistemic set. And since to evaluate the modal claim, one needs to know what the modal base is, use of X-marking makes clear that some departure from what is epistemically given needs to be contextually salient. This is correct. Consider for example an out of the blue use of the following *if*-less *would* (from Roberts and also discussed in von Fintel, 1994):

- (34) I would plant an apple tree.

It will be hard to make sense of an utterance of (34) if no antecedent can be reconstructed.

This article is not the time to delve into *if*-less *would* cases like these. But it is important to realize that the phenomenon is wide-spread.

So, the cases of X-marked modals/attitudes that we saw in (30) are entirely expected. From the Kratzerian perspective that we follow, the most plausible formal analysis of such cases is one where there are two layers of modality: the higher layer (*would*) is where the X-marking is located and it signals that we're talking about worlds that are at least potentially outside the epistemic set, the lower layer is provided by the modal/attitude embedded underneath *would* (*have to* or *want to* in (30)) and it is evaluated in the worlds that the higher *would* took us to.²⁹

We find such interpretations of X-marking on modals and attitudes across all the languages we have explored. What we turn to now are crucially distinct readings of such structures in some languages, a phenomenon that will need to be accounted for by successful theories of X-marking.

Part II: Other uses of X-marking

Existing accounts of X-marking (albeit not under that name) are all about X-marking in conditionals. From a very high level perspective, they all share the diagnosis that X-

²⁹ Later on, we will call this configuration “exo-X”, to distinguish it from a one-layer semantic configuration that we call “endo-X”. See Sect. 5.3.

marking concerns the domain of quantification of the conditional. What we will now add to the mix are uses of X-marking outside of conditionals and the challenges they raise for the semantic analysis of X-marking and the prospects of a unified account.

5 Non-conditional uses of X-marking

We will focus on just two non-conditional environments where X-marking appears: “X-marked desires”, where X-marking appears in a desire construction, and “X-marked necessity”, where X-marking appears on a necessity modal. (Some other uses of X-marking are briefly mentioned in Sect. 5.4.)

5.1 X-marked desires

Consider the English expressions of wishes in (35):

- (35) a. I wish I had bought a different car.
 b. I wish Aline were here now.
 c. I wish my book sold/would sell well next year.³⁰

We observe that the complement of *wish* has the same X-marking morphology that we find in the antecedent of X-marked conditionals. We also observe parallels in the interpretation: (35a,b) convey the counterfactuality of the prejacent proposition (pastX: I did not buy a different car; presX: Aline is not here now), while (35c) has the FLV-type property of leaving it open whether my book will sell well.³¹ One might use the term “counterfactual wish” but we worry that this would be potentially misleading in two ways: (i) the desires reported in (35) are desires in the actual world, and crucially not desires in a some other, counterfactual, world, and (ii) in its FLV-incarnation (i.e. with a future-oriented predicate) the complement is not necessarily counterfactual nor even unattainable.

In many languages, there isn’t a lexical distinction between wants and wishes as in English. Instead, there is a morphological commonality between X-marked conditionals and the expression of wishes (Iatridou, 2000): wishes use the same lexical item as wants but the distinction is effected via X-marking. In the full version of the pattern, “consequent X-marking” morphology appears on the embedding verb *want*, and “antecedent X-marking” morphology appears on the complement of *want*.

Schematically, what we call the “Conditional/Desire” (C/D) pattern looks as follows:

- (36) a. X-marked conditional: if p_{ant} , q_{cons}
 b. wishes: I want_{cons} that p_{ant}

³⁰ We have found variation between speakers as to the choice between the bare *sold* or the modalized *would sell*. We have nothing to say about this.

³¹ Note that if the complement of *wish* is an NP (*I wish you a happy New Year*) or an infinitival complement (*I wish to leave now*), the meaning is very different. This, by the way, is indirect evidence that the X-marking on the complement plays a crucial role in itself.

We will use the term “transparent *wish*” when the meaning of *wish* (i.e. actual world desire for an unattainable complement, or an FLV-type case like (35c)) is expressed by X-marking on a desire predicate. The idea of the terminology (which is parallel to the term “transparent *ought*” coined in von Fintel & Iatridou, 2008) is that what English expresses in the lexicalized form *wish* is instead expressed, “more transparently”, in combinatory morphology.

As we have said, there are languages without a morphological difference between antecedent and consequent X-marking. We saw that Hungarian is such a language, and that moreover, it has a dedicated X-marker. The way the C/D pattern manifests is that the X-marker *-nA* appears both on the desire verb and on its complement. Recall Hungarian X-marked conditionals:

- (37) Ha János tudná a választ, Mari is tudná a választ.
if János know-*nA* the answer Mari too know-*nA* the answer
'If János knew the answer, Mari would know the answer.'
- (38) Ha János tudta volna a választ, Mari is tudta volna
if János know.PST be-*nA* the answer Mari too know.PST be-*nA*
a választ.
the answer
'If János had known the answer, Mari would have known the answer too.'

To talk about desires and wishes, here is the verb that means ‘like’³²:

- (39) Szeretem, hogy tudja a választ.
like that know the answer
'I like that she knows the answer.'

X-marking on the ‘like’-verb and its complement yields the effect we’re concerned with, the want turns into a wish:³³

- (40) Szeretném ha Marcsi tudná a választ.
like-*nA* if Marcsi know-*nA* the answer
'I wish Marcsi knew the answer.'

In other languages, like Greek and Spanish, antecedent X-marking differs from consequent X-marking and there the C/D pattern shows up more clearly. In Spanish, antecedent X-marking consists of past subjunctive and consequent X-marking consists

³² This verb is factive without *-nA*. The paradigm can be set up with the verb translating as ‘want’, but this verb selects for subjunctive/imperative morphology on its complement and so displays only half of the C/D pattern, just like French does. See Footnote 43.

³³ The switch from the complementizer *hogy* (‘that’) to *ha* (‘if’) does not concern us here. This switch also happens in English:

- (i) a. I am happy that you know the answer.
b. I would be happy if you knew the answer.

See Longenbaugh (2019: section 4.4), see also Sode (2018, 2021).

of “conditional” mood. The way the C/D pattern then manifests is that conditional mood will appear on *want* and past subjunctive on the complement of *want*. Here is a Spanish X-marked conditional:

- (41) Si fuera más alto sería un jugador de baloncesto.
 if be.PST.SUBJ more tall be.COND a player of basketball
 ‘If s/he was taller, s/he would be a basketball player.’

And here is a Spanish X-marked desire:

- (42) Querría que fuera más alto de lo que es.
 want.COND that be.PST.SUBJ more tall than it that be.PRS
 ‘S/he wishes s/he was taller than s/he is.’

Spanish, Greek, Hungarian, and others are “transparent *wish*” languages. English has a lexicalized item *wish* and manifests only one part of the C/D pattern, namely “antecedent” X-marking on the complement of the desire verb.³⁴ This can be seen in the pair in (43), where there is “fake” past in the antecedent in (43a) and the complement in (43b):

- (43) a. If I had a car now, I would be happy.
 b. I wish that I had a car now.

If English had been a transparent *wish* language,³⁵ it would have had *would* on *want*, as *would* is consequent X-marking, as in (44a). That is, if English were a transparent *wish* language, (44b) would have meant (44c), which it does not:

- (44) a. If I had a car, I would be happy.
 b. I would want that I had a car now. ≠
 c. I wish that I had a car now.

³⁴ Recall from Footnote 31 that with *wish*, the unattainable desire reading results only with finite complements, which have to be X-marked, and not with nominal complements (*I wish you a Happy New Year*) or infinitives (*I wish to leave now*).

³⁵ The statement “English is not a transparent *wish* language” is actually a misleading simplification. We are not dealing with a language-level parameter setting. A language can have lexicalized items, like English *wish*, but at the same time behave like a “transparent language” with other verbs. For example, Longenbaugh (2019) shows that (i)/(ii) are instances of clausal subordination, not conditionals, and that moreover, they display something like the C/D pattern in terms of morphology: the embedding predicate has consequent X-marking and the embedded predicate has antecedent X-marking (and strikingly the antecedent marker *if*):

(i) I would be happy if you knew the answer.

(ii) I would prefer if you left.

In addition, and crucially, Longenbaugh shows that (i)/(ii) are about actual-world preferences, not preferences in a counterfactual scenario. So even English has corners where it is a “transparent language”, since it has (i)/(ii) in addition to the lexicalized item *wish*. Even so, we continue using the term “transparent language”, hoping that the reader will remember this footnote.

Even though English *wish* is not an example of a transparent *wish*, sentences with this item do show one part of the C/D pattern, as we saw, namely the same morphology (fake past) appears on the conditional antecedent and on the complement of the desire predicate.

Turkish³⁶ is another language like English, which has a specialized morpheme for unattainable wishes. And like English, it displays the C/D pattern only in the complement of the desire expression. So first let us look at X-marking in Turkish conditionals. Turkish is a fake past language, as can be seen by the use of the “fake” past morpheme in both antecedent and consequent of the FLV in (45). More specifically, consequent X-marking consists of *aorist+past*.

Antecedent X-marking consists of what is called by grammars the “conditional” affix -*sA*, followed by the past morpheme, namely *SA+past*³⁷:

- (45) John önümüzdeki salı gel-*se-ydi*, annesi çok mutlu ol-*ur-du*.
 John next Tue come-*SA-PST* his.mom very happy be(come)-*AOR-PST*
 ‘If John arrived next Tuesday, his mom would be very happy.’

Turkish has the undeclinable (non-verbal) particle *keşke*³⁸ to convey *wish*:

- (46) Keşke önümüzdeki salı gel-*se-ydi*.
 keşke next tuesday come-*SA-PST*
 ‘I wish he would come next Tuesday.’

In (46) the speaker believes that her wish will not come true. What we also see in (46) is that the complement of the desire-embedder carries antecedent X-marking, namely *SA+past*. The past morpheme is obviously “fake” since we are talking about (im)possible events in the future. Moreover, the order of morphemes is the tell-tale one of X-marked antecedents: *SA+past* (see Footnote 37). So Turkish is a language which, like English, displays the complement part of the C/D pattern but not the *want* part (i.e. it does not have transparent *wish*).

Hindi³⁹ has a similar particle to Turkish, but we will look into this language because even though Hindi’s *kaash* may be related to Turkish *keşke*, its X-marking is different. Hindi *taa* is described as a habituality marker. However, it cannot appear on a predicate that is by its nature individual-level (as reported by Iatridou (2000), based on p.c. from Rajesh Bhatt). It can only appear on “derived” generics:

- (47) vo macchlii khaa-*taa hai*.
 he fish eat-*HAB be.PRS*
 ‘He eats fish.’ (i.e. he is a fish-eater)

³⁶ All of the Turkish data in this article are from Ömer Demirok (p.c.).

³⁷ It should be noted here that in Turkish we see the very interesting phenomenon in which fake past in a conditional antecedent appears in a different place than the temporally interpreted past. So in an epistemic conditional like *if he left last Tuesday he must have arrived on Friday*, the order of morphemes is *past-SA*.

³⁸ *keşke* is probably related to Hindi *kaash*, which we will discuss shortly, with both elements possibly derived from Persian. Similar particles are Spanish *ojala*, Greek *makari*, Italian *magare*. Possibly even English *if only* and *would that*.

³⁹ All Hindi facts in this article are either due directly to Rajesh Bhatt (p.c.), or Iatridou (2000, 2009), which in turn also relied on Bhatt (p.c.) for Hindi judgments and discussion.

- (48) *vo lambaa ho-taa (hai).
 he tall be-HAB (is)
 'He is tall.' (attempted)

But *taa* does appear on individual-level predicates in X-marking:

- (49) agar vo lambaa ho-taa, to army use bharti kar le-tii.
 if he tall be-HAB then army him admit do take-HAB
 'If he was tall, the army would have admitted him.'

That is, "fake" habitual is part of Hindi X-marking in both antecedent and consequent.⁴⁰ The same conclusion is supported by the following argument. The habitual marker cannot co-occur with the progressive:⁴¹

- (50) *vo gaa rahaa ho-taa
 he sing PROG be-HAB
 'He is habitually singing.' (attempted)

But in an X-marked conditional, HAB and PROG co-occur:

- (51) He is not singing ...
 agar vo gaa rahaa ho-taa, to log wah wah kar rahe ho-te.
 if he sing PROG be-HAB then people 'wow' 'wow' do PROG be-HAB
 'If he was singing, people would be going 'wah wah'.'

Since the habitual marker is part of Hindi (antecedent) X-marking, by the C/D pattern, we expect it in the complement of *kaash*. This prediction is verified. HAB appears on an individual-level complement of *kaash*:

- (52) kaash vo lambaa ho-taa.
 wish he tall be-HAB
 'I wish he was tall.'

And it appears also on a progressive event description in the complement of *kaash*:

⁴⁰ See Bhatt (1997) for discussion of a possible fake past in Hindi.

⁴¹ The order of morphemes in (50), PROG- HAB, is acceptable when we want the habitual marker to scope over the progressive marker, as in the following sentence:

- (i) Jab bhii mEN us-se mil-ne jaa-taa, vo (gaane) gaa rahaa ho-taa.
 when ever I he-with meet-INF go-HAB, he songs sing PROG be-HAB
 'Whenever I visited him, he would be singing songs.'

But of course no such meaning is necessary for the grammatical string PROG- HAB in X-marking, as in (51). Incidentally, note that the only possible translation for (i) is the one given, namely with the past tense. The sentence cannot mean 'Whenever I visit him, he is singing songs'. According to Rajesh Bhatt (p.c.) this is an argument that *taa* is PAST+HAB, which would make X-marking in Hindi very similar to that in Greek and Romance, where we find the combination past+imperfective. (See Iatridou, 2000 and Ferreira, 2016 for arguments that the component of the imperfective that is at play in X-marking is the habitual and not the progressive.)

- (53) *kaash vo gaa rahaa ho-taa.*
 wish he sing PROG be-HAB
 ‘I wish he was singing.’

Finally, the following instantiation of the C/D pattern is too cute to omit. Since Hindi X-marking contains a fake HAB, one expects (and gets) two occurrences of HAB in an X-marked conditional when there is an actual generic predicate in the antecedent:

- (54) *Agar vo macchlii khaa-taa ho-taa, to use yeh biimaarii nahiiN ho-tii.*
 if he fish eat-HAB be-HAB then he this illness NEG be-HAB
 ‘If he ate fish (on a regular basis), then he would not have this disease.’

This correctly predicts that we should also get two HAB markers when the complement of *kaash* is a generic predicate:

- (55) *kaash vo macchlii khaa-taa ho-taa.*
 wish he fish eat-HAB be-HAB
 ‘I wish he ate fish.’ (i.e. I wish he was a fish-eater)

So the C/D pattern is real, even if there are languages, like English, Turkish and Hindi,⁴² which manifest only one part of this pattern.⁴³

⁴² The behavior of English and Turkish are also arguments against the possibility of seeing the occurrences of past under X-marked desires, in e.g. Spanish, as the result of Sequence of Tense. English *wish* is not in the past tense so we should not expect it to be an SoT trigger and Turkish *keşke* is not even a verb to begin with.

⁴³ French is in a way the mirror image in that it displays the C/D pattern only in the transparent wish part: the verb *vouloir* (‘want’) appears in the “conditional” mood. The complement of *vouloir* takes an infinitive or a subjunctive complement depending on the (contra)indexing of the subjects, and this choice is retained under X-marked *vouloir*, contra the C/D pattern:

- (i) a. *Je veux aller à Paris.*
 I want go.INF to Paris
 b. *Je veux que tu ailles à Paris.*
 I want that you go.SUBJ to Paris
- (ii) a. *Je voudrais aller à Paris.*
 I want.COND go.INF to Paris
 ‘I wish to go to Paris.’ (cf. ‘I would have wanted to go to Paris’)
 b. *Je voudrais que tu ailles à Paris.*
 I want.COND that you go.SUBJ to Paris
 ‘I wish you would go to Paris.’

So French is a transparent *wish* language, but it does not manifest the complement part of the C/D pattern. The C/D pattern (rather, whatever is behind it) would show indicative past imperfective on the complement of *vouloir*, as that is what French antecedent X-marking is. On the other hand, French *vouloir* requires subjunctive on its complement and it seems that the selection requirements of *vouloir* win. In Spanish, there is no such conflict: Spanish *querer* requires subjunctive on its complement. The C/D pattern would have past subjunctive. The complement of *querer* in a Spanish X-desire can satisfy both requirements, because Spanish, unlike French, has a past subjunctive.

Finally, a note about French wishes: one of our reviewers and several but not all of our informants do not accept the use of *voudrais* for unattainable wishes in (ii) above. The reviewer points out that these sentences become good by adding the adverb *tellement* (‘so much’) or using the verb *aimerais* instead. We do not have any further thoughts on these details.

In sum, in this subsection we have seen that there is an environment where X-marking appears outside conditionals and that this has an interpretation other than the otherwise expected shifted evaluation world reading: X-marked desires are used to express wishes in the actual world.

5.2 X-marked necessity

The second environment where we see X-marking outside of conditionals without a shifting of the evaluation world is necessity modals. As discussed in detail in von Fintel and Iatridou (2008), necessity modals often come in strong versus weak variants/pairs. In English, for example, we can distinguish weak necessity modals *ought*, *should* and strong necessity modals *must*, *have to*. One way to show that weak necessity modals are not strong is that they can occur without contradiction with the negation of a strong necessity modal:

- (56) a. You ought to do the dishes but you do not have to.
 b. #You must do the dishes but you do not have to.

It is important to note that the strong/weak necessity distinction holds across modal flavors: it arises not just with deontic modality as in (56), but also with epistemic modality and goal-oriented modality:

- (57) a. Given that it is Tuesday, Morris ought to be in his office.
 b. To go to Amherst, you ought to take Route 2.

English has lexicalized weak necessity modals like *ought* but many other languages do not (von Fintel & Iatridou, 2008). In those languages, the modal that shows the pattern in (56) is an X-marked necessity modal.

In Hungarian, its X-marker *-nA* appears on the modal and without it the sentence is a contradiction. That is, the following pattern is exactly like (56):

- (58) Péter-nek el kell-ene mosogat-ni-a az edényeket, de senki nem
 Péter PART must-*nA* wash-INF the dishes but noone not
 követeli meg tole.
 require PART he
 ‘Péter ought to do the dishes, but he is not obliged to.’

- (59) #Péter-nek el kell mosogat-ni-a az edény-ek-et, de senki
 Péter PART must wash-INF the dishes but noone
 nem követeli meg tole.
 not require PART he
 ‘Péter has to do the dishes, but he is not obliged to.’

Hungarian is a language in which antecedent X-marking and consequent X-marking are the same. So we do not know which of the two appears on the modal. However, once we look at other languages, we see that it is consequent X-marking, not antecedent X-marking, that appears on the necessity modal to yield weak necessity. Consider Spanish:

- (60) a. #Debo limpiar los platos pero no estoy obligado.
 must clean the dishes but not am obliged
 b. #Tengo que limpiar los platos pero no estoy obligado.
 have COMPL clean the dishes but not am obliged

With consequent X-marking on the modal, the sentence passes the *ought*-test:

- (61) a. Deberia limpiar los platos, pero no estoy obligado.
 must.COND clean the dishes but not am obliged
 ‘I ought to do the dishes but I am not obliged.’
 b. Tendria que limpiar los platos, pero no estoy obligado.
 have.COND COMPL clean the dishes but not am obliged
 ‘I ought to do the dishes but I am not obliged to.’

So Spanish, as well as Greek and others (see von Fintel & Iatridou, 2008) are “transparent *ought*” languages.

If English had been a transparent *ought* language, it would have had *would* on *have to*, and (62b) would have meant (62c), which it does not:

- (62) a. If I had a car, I would be happy.
 b. You would have to do the dishes but you are not required to. ≠
 c. You ought to do the dishes but you are not required to.

So the way there is a Conditional/Desire pattern, morphologically speaking, there is also a Conditional/Ought pattern, again morphologically speaking. We saw that the C/D pattern has two parts, one regarding transparent wish, and one regarding the complement of the desire verb. One may therefore ask whether there is a complement part to the C/O pattern as well. For many languages this cannot be tested because modals take infinitival complements. However, Greek is a language whose modals can take complements that are inflected and so there is an embedded verb that can in principle carry antecedent X-marking morphology. In (i), the translation corresponding to the *ought*-test in (56a), there is no X-marking on the complement, and this makes intuitive sense: the complement is not a contra-to-fact situation, unlike in most cases of transparent wishes.

- (63) Tha eprepe na plinis ta piata ala dhen ise ipexreomenos na
 FUT must.PST NA wash the dishes but NEG are obliged NA
 to kanis
 it do
 ‘You ought to wash the dishes, but you’re not obliged to.’

It is possible to put X-marking on the complement of an X-marked necessity modal, as in (ii), but then the sentence translates as *you ought to have done the dishes*, where indeed the complement is contra-to-fact.⁴⁴

- (64) Tha eprepe na iches plini ta piata
 FUT must.PST NA have.PST washed the dishes
 ‘You ought to have washed the dishes.’

5.3 A principled ambiguity: *endo-X* versus *exo-X*

We saw in Sect. 4 that when one puts X-marking on modals and attitudes, it is entirely expected that we would get interpretations where the evaluation world is shifted away from the actual world, to some salient, possibly counterfactual scenario. This entirely expected reading is available for X-marked desires and X-marked necessity in all the languages we have looked at (as we will soon show). The remarkable fact is that there is another reading that does not involve a shift in the evaluation world: X-marked desire claims can be about actual world desires and X-marked necessities can be about actual world necessities. We will now discuss this principled ambiguity in these constructions in transparent languages.

Let us start with X-marked necessity. Sentences that contain this are ambiguous between a weak necessity modality in the actual world (like English *ought*) and a strong necessity modal in a counterfactual world (English *would have to*). In transparent *ought* languages, these are the same form. Consider Greek for example, where consequent X-marking is a combination of future and past and imperfective. On the strong necessity modal, this can yield the meaning of weak necessity *ought*:

- (65) (Nomizo oti) *tha eprepe* na pas me plio. Ine poli
 (think that) FUT must.PST.IMP NA go with boat. Is much
 pio orea diadromi ap’oti me to leoforio
 more beautiful trip from that with the bus.
 ‘(I think that) you ought to go by boat. It’s a much prettier trip than by bus.’

But it can also yield the meaning of a strong necessity modal in a “counterfactual” scenario:

- (66) Eftichos pu then thelis na pas eki. An itheles na pas, *tha*
 fortunately that NEG want NA go there. If want NA go, FUT
eprepe na pas me plio. Ke ksero oti esena se pirazun
 must.PST.IMP NA go with boat. And know.1sg that you CLIT bother
 ta karavia.
 the boats.
 ‘Fortunately, you don’t want to go there. If you wanted to go there, you would have to go by boat. And I know that boats bother you.’

Note that the weak necessity claim in (65) signals there is more than one way to get to the island but the boat is by some measure deemed preferable by the speaker. In the

⁴⁴ It has not escaped our notice that the last observation about English immediately suggests a possible hypothesis: the infinitival *have in ought to have done* is a form of X-marking. We will not pursue this here.

strong necessity claim in (66), however, the boat is the only way to get to the island.⁴⁵

We propose to call the two interpretations of X-marking on necessity modals *endo-X* and *exo-X*:

endo-X the modal is making a claim about the *actual* world

exo-X the modal is making a claim about *other* worlds in which some hypothetical/counterfactual scenario holds

X-marked desires in transparent languages are equally ambiguous, and in the same two directions. Sentences that contain an X-marked desire are ambiguous between a desire in the actual world (like English *wish*) and a desire in a counterfactual scenario (English *would want to*). In transparent *wish* languages, these are the same form. Consider X-marking on the Greek verb *thelo* ('want'). It can yield a desire in the actual world towards something unattainable:

⁴⁵ One might wonder how one would express a weak modality in a counterfactual scenario. This is already hard in English:

- (i) If you wanted to please your roommate, you ^{!!}would have to/[?]ought to/*would ought to do the dishes.

In (i), *would have to* is grammatical but does not express weak necessity, *ought to* seems dubious (because of lack of X-agreement?), and *would ought to* is plainly ungrammatical.

In transparent *ought* languages this is also difficult because one would need double X-marking, for which verbs in the languages that we are familiar with have no space. One might then wonder whether one layer of X-marking could serve as two, since after all, there is no space for exponents of two such layers. This meaning may indeed be detectable but we leave this for a different occasion.

Similar considerations apply for the expression of unattainable wishes in a counterfactual scenario. Compare (ii) and (iii) below. Both sentences have X-marking in the antecedent, as well as consequent X-marking on the verb *thelo* ('want'). What they differ in is the form of the verb embedded under X-marked *thelo*. In (ii) the verb *agorazo* ('buy') is in the non-past perfective, the O-marking appropriate for this environment. In (iii) the verb *ime* ('be') is X-marked.

- (ii) An o Haris itan psiloteros tha ithele na agorasi megalitero
if the Haris be.PST taller FUT want.PST.IMP NA buy.NPST.PERF bigger
krevati
bed
'If Haris was taller, he would want to buy a bigger bed.'

- (iii) An o Haris itan psiloteros tha ithele na itan ke Amerikanos
if the Haris be.PST taller FUT want.PST.IMP NA be.PST and American
'If Haris was taller, he would wish that he was also American.' (...so that he could be drafted to the NBA more easily)

As can be seen from the translations, the bouletic verb *thelo* appears in a counterfactual scenario in both (ii) and (iii). However, in the counterfactual scenario in (iii), the bouletic verb is marked as having an unattainable complement, since its complement is X-marked. This means, that in (iii), *thelo* should have two layers of X-marking: one layer because it is the consequent of an X-marked conditional and one layer because it is an unattainable desire. There is no space for this extra morphology, however. So the single-X-marked and the double-X-marked verbs look the same. In English, the two sentences can be easily told apart, as all that has to happen is one level of X-marking on the verb *wish* in (iii), since *wish* is the lexicalization of a bouletic verb with an unattainable complement (when the latter is a CP).

We realize that (ii)/(iii), while minimal pairs with respect to O-/X-marking, are not minimal pairs with respect to the lexical items. This is to explicate the point in a more concise manner. This is a footnote after all.

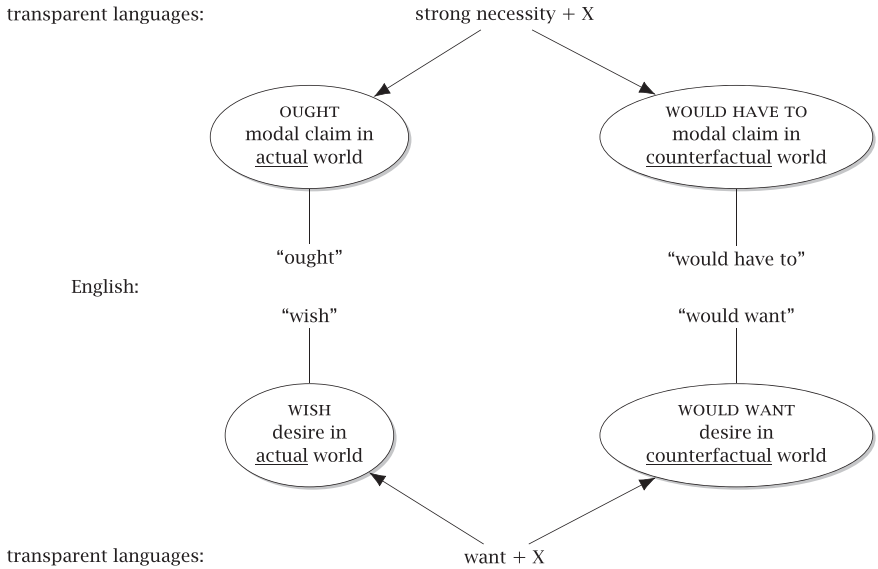


Fig. 3 The ambiguity of X-marking on desires and necessity

(67) *tha ithele na ixē makritero krevati*
 FUT want.PST.IMP NA had longer bed
 ‘He wishes he had a longer bed.’

Or a desire in a counterfactual scenario:

(68) *An itan piloterōs tha ithele na exi makritero krevati*
 if was taller FUT want.PAST.IMP NA has longer bed
 ‘If he was taller he would want to have a longer bed.’

The crosslinguistic picture is summarized in Fig. 3,⁴⁶ modified from von Stechow and Iatridou (2008). With our current terminology, we would call the interpretations on the left side of the diagram *endo-X* and the ones on the right side *exo-X*.

Recall that in Sect. 4, we suggested that there is an expected two-layered meaning of X-marked modals/attitudes. This is what we now call *exo-X* and it is what is found on the right side of the diagram in Fig. 3. The nature of *endo-X* in contrast is plausibly that there is just one layer of modality and that X-marking carries a signal about the modal parameters (modal base, ordering source) of the modal/attitude it is attached to.

We note one striking difference between X-marked desires and X-marked necessity. For the latter, X-marking comes with a weakening of the modal claim, but there is no sense of weakening in the case of unattainable desires. A successful theory of X-marking should explain this difference.

⁴⁶ We would like to remind the reader of Footnote 35.

We have now seen that X-marking appears not just on conditionals but also in desire constructions and with necessity modals. A theory of X-marking should have the ambition of covering all these uses in a unified analysis. The first step towards that is to find a common denominator for the meaning contribution of X-marking in all these cases. The second step would be to find an analysis that explains how in each language the morpho-syntactic components of X-marking (such as fake tense, fake aspect, subjunctive, etc.) contribute to its meaning. For this article, we leave the second step aside, as already mentioned, and discuss the prospects for a unified meaning for X-marking as an atom.

Before we turn to what a unified meaning for X-marking might be, we would like to discuss two issues: (i) is our focus on desires and necessity modals too narrow? (ii) could what we have called endo-X be reduced to exo-X and thus be solved more easily?

5.4 Are there more uses of X-marking?

The two non-conditional, endo-X uses of X-marking that we have discussed are with desire predicates and necessity modals, and we will focus on those in the remainder. But we should mention that this can't be the whole story:

- X-marking with an endo-X interpretation can also appear on possibility modals, where one tempting intuition is that it contributes a meaning of “remote possibility” (somewhat akin to the unlikelihood meaning often attributed to FLVs, but as we saw in Sect. 3.5, that is not entirely unproblematic).⁴⁷
- One often finds X-marked modals and attitudes described as adding a layer of politeness on top of the meaning that the O-marked version would have conveyed. So, a sentence like *I would prefer red wine* states an actual preference but one that is somehow expressed more politely. We do not know what to make of this widespread phenomenon, let alone how to integrate it into the overall analysis of X-marking.⁴⁸

⁴⁷ In an unpublished general paper, Takács (2021) demonstrates that in a number of languages, including Hungarian and Greek, X-marking on possibility modals can have another meaning: signalling that the speaker doesn't believe that the prejacent is true but that someone other than the speaker thinks it's possible.

In general, an epistemic possibility modal cannot be used when the speaker believes the prejacent to be false:

- (i) Miranda might be home. (# when I know Miranda is on campus)

Takács shows the following data from Hungarian:

- (ii) Context: Chris and Burt are sitting by the window in a cafe. When a bus goes by they see their friend Ann, who is angry with Burt, jumping behind a bush. Chris asks Burt why Ann did that. Burt responds:
- a. #Az-on a busz-on le-het-ek.
DEM DEF bus be-POSS
'I might be on that bus.'
- b. Az-on a busz-on le-het-n-ék.
dem-sup DEF bus be-POSS-X
'I might be on that bus.'

Note that only the version with X-marking is good. (iia) is not good because Burt knows that he is not on the bus. The example is modelled after one in Egan et al. (2005).

⁴⁸ Thanks to a reviewer for raising this use of X-marking.

- In some languages, sentences with approximatives like *almost* come in both O- and X-variants, with subtle differences that remain unexplored.⁴⁹
- In German, as described and analyzed by Csipak (2020), X-marking on a simple non-conditional sentence can be interpreted as committing to the actual truth of the prejacent and offering it as a possible solution to a salient decision problem.

We wouldn't be surprised if there is even more.⁵⁰

There is also the converse question in a way: there are environments where all the necessary grammatical ingredients are present, but no endo-X reading comes about. We already saw two such cases in English, collected here for convenience:

- (69) a. If I had a car, I would be happy.
 b. I would want that I had a car now. \neq
 c. I wish that I had a car now.
- (70) a. If I had a car, I would be happy.
 b. You would have to do the dishes but you are not required to. \neq
 c. You ought to do the dishes but you are not required to.

As we already know at this point, English consequent X-marking is *would* + VP, as seen in (69a)/(70a). And of course, (69b) and (70b) only have the exo-X reading. In transparent languages, the consequent morphology that would have appeared in (69a)/(70a) would have yielded the endo-X reading when placed on the matrix verb, in (69b)/(70b) (in addition, of course, to the exo-X reading). That is, in transparent languages, (69b) would be about a desire in the actual world and (70b) about (weak) necessity in the actual world.

But in English, (69b)/(70b) only have the exo-X reading. That is, (69b) is not equivalent to (69c), nor (70b) to (70c). As we saw in Fig. 3, English has special lexical items for some⁵¹ of its endo-X readings. Does this explain the non-equivalence of (69b,c) and (70b,c)? That is, is there a blocking effect going on for the composition of (69b)/(70b) into an endo-X reading? That might be one possible explanation for the fact that (69b)/(70b) lack the endo-readings. However, we think that it is too early to conclude this, so we are placing also this question on the to-do list.

Finally, it is instructive to discuss a case raised by a reviewer, who was suggesting that relevant uses of X-marking as well as the C/D pattern, also occur with doxastic attitudes. Their example was the following, naturally occurring Italian sentence:

- (71) Il cucciolo crederebbe che sia sbagliato.
 the puppy think-X_{cons} that be.PRS.SUBJ messed-up
 'The puppy would think that it had done something wrong.'

⁴⁹ There is very little work that even recognizes the phenomenon; however, see Rapp and von Stechow (1999), Amaral (2007), McKenzie and Newkirk (2020), and Baron (2022: Section 6.1) for some data and ideas.

⁵⁰ For some examples of other uses of X-marking, one could look at Steele (1975), James (1982), Fleischman (1989), for starters.

⁵¹ The reason we say "some" here is Footnote 35.

The context for the example turns out to be a document with guidelines for how to train a new puppy. The new owner is being told not to reprimand the puppy for doing “its business” in the house, because if the owner did that, the puppy would misunderstand the signal and would think that it had done something wrong by doing its business in plain sight of the owner (and would thus hesitate to do its business even on an outdoor walk and rather prefer to do it when alone, no matter where it is). In other words, the example is about a hypothetical belief the puppy would have if the owner reprimanded it. This is thus clearly a case of what we call “exo-X”: the X-marking on the attitude verb signals that the attitude is evaluated in a hypothetical environment. We therefore disagree with the reviewer that this shows that X-marking on epistemics is parallel to what happens with bouletics. There is no “endo-X” interpretation of (71), which might talk about an actual belief with a counterfactual complement. In fact, such an interpretation is inconceivable.⁵²

In fact, we have not come across any endo-X doxastics. This raises the question of why the relevant uses of X-marking apparently only occur with metaphysical, epistemic, bouletics, teleological, and deontic modality. We do not know and thus we leave this as an open puzzle: *Why can endo-X-marking not occur on doxastic modals/attitudes?*⁵³

5.5 No easy way to reduce endo-X to exo-X

Let us quickly dispense with one attempt at reducing all three of our uses of X-marking (conditional, wishes, weak necessity) to a common denominator. In von Fintel and

⁵² We should also point out that the item *sia* in the complement of *credere* in (71) is a present subjunctive, not the past subjunctive of Italian X-marked antecedents and so, the example doesn't fit the C/D pattern anyway. In contrast, the complement of transparent wishes in Italian is past subjunctive, consistent with the C/D pattern:

- (i) Vorrei che fosse a Roma in questo momento
want.COND che be.PST.SBJ.IMPF in Rome in this moment
'I wish she was in Rom right now.'
- (ii) Se fosse a Roma in questo momento, ci avrebbe chiamati
if was in Rome in this moment CLIT have.COND called
'If she was in Rome, she would have called us.'

We thank Stan Zompì (p.c.) for help with the Italian data.

⁵³ A reviewer points out that X-marking easily occurs with negated belief attributions. They provide the following naturally occurring example from Italian:

- (i) Le scarpe sono carine e non si crederebbe che siano di legno
the shoes are cute and NEG one believe.COND that be.SUBJ of wood
'The shoes are cute and one wouldn't believe that they're made of wood.'

This is just fine in a scenario where it is in fact common ground that the shoes are made of wood. Is this endo-X on a belief-predicate? Or is it exo-X conjuring up a scenario where one encounters the shoes without prior knowledge and where one would then not think that they are made of wood? We do not know, but we add that negated belief is mysterious in many ways. Consider:

- (ii) I can't believe they're made of wood.

This is felicitously uttered by someone who in fact knows (and thus believes) that they're made of wood. What is going on?

Iatridou (2008), the proposal was floated that X-marked necessity involves a meta-linguistic counterfactual conditional operating on the necessity modal: “if we were in a context in which the secondary ordering source was promoted, then it would be a strong necessity that ...”. Whatever one might think of the prospects of this idea, it’s instructive to try to extend it to X-marked desires. Could the X-marking there be a reflection of an implicit counterfactual analysis?

The idea might be that “wish that p ” means something like “if p were attainable, would want that p ”. To put this kind of proposal to the test, let’s imagine Laura is the sort of person who only wants things that are attainable. If something is unattainable, that suffices for her to not want it. I happen to know her general tastes in men and know with certainty that Pierce Brosnan falls within that category. As things stand, a date with him is unattainable, hence Laura has no desires about it. Now consider:

- (72) Laura querría que Pierce Brosnan quedara con ella.
 Laura want.COND that Pierce Brosnan go-out with her
 ‘Laura wishes that Pierce Brosnan would go out with her.’

If the implicit counterfactual conditional analysis we are evaluating for sentences like (72) were adequate, we would expect the sentence to be judged as true in our scenario. After all, if a date with Pierce Brosnan were attainable, Laura would want to go out with him. But (72) is judged as false, which means that the sentence conveys the existence of a desire in the actual world. And since Laura doesn’t have the desire to go out with him, because a date is unattainable, the sentence is false. So, a quick reduction of X-marked desires (and let’s face it, X-marked necessity) to some kind of meta-linguistic implicit counterfactual is not feasible.

5.6 Interim summary

We can summarize the cases we have seen as follows:

- (73) a. X-marked conditionals
 b. X-marked necessity which yields a weak necessity in the actual world (endo-reading)
 c. X-marked necessity which yields a strong necessity in a counterfactual scenario (exo-reading)
 d. X-marked desire which yields a wish in the actual world (endo-reading)
 e. X-marked desire which yields a desire in a counterfactual scenario (exo-reading)

And we have proposed that the exo-X readings are all essentially X-marked conditionals, whether with or without an explicit antecedent. This means that our question becomes what X-marking does in the following three cases:

- (73) a. X-marked conditionals (including ones with desire predicates and necessity modals in the consequent)
- b. X-marked necessity which yields a weak necessity in the actual world (endo-reading)
- d. X-marked desire which yields an unattainable desire in the actual world (endo-reading)

It's time to see what the prospects are for a theory of X-marking that at least unifies these three cases: conditionals, desire attitudes, and necessity modals.

6 Extending the account

In this final section, we continue to leave aside the question of what the morphological composition of X is and why. Instead, we pretend X is a non-decomposable whole and ask the following question: what would have to be true of the meaning contribution of X so that for conditionals it marks Stalnakerian domain widening, at the same time as it marks a desire as a wish and a necessity as weak. We tackle the two cases of desires and necessity modals in that order. Along the way, we will see that the “past-as-past” kind of approach faces obvious issues with extending to these cases.

6.1 X-marked desires

Our Stalnaker-inspired picture of the meaning of X-marking in conditionals is that X marks the widening of the domain of quantification of the conditionals: worlds outside the default set (context set or epistemic set) are included in the domain. Can this picture be extended to the case of X-marking in desire ascriptions?

The simplest, minimally viable analysis of the semantics of *want* is something like this:⁵⁴

$$(74) \llbracket \text{want} \rrbracket^w = \lambda p. \lambda x. \forall w' \in \text{BEST}_{(w,x)}(D): p(w') = 1$$

This says that an agent x wants p in world w iff all of the worlds in the relevant domain D that are “best” as far as x in w is concerned are p -worlds.

What is the domain D ? And does it make sense to think of X-marking in the case of desires as marking a widening of the domain, just as it does by assumption in the case of conditionals?

The consensus in the literature is that the domain of desire ascriptions is related to or identical to the set of doxastically accessible worlds for the agent of the desire, the agent's belief set or doxastic set. The original argument for this (developed in Heim,

⁵⁴ See von Fintel (1999) for this kind of proposal. For much more on the semantics of desire predicates, see among others: Heim (1992), Villalta (2008), Rubinstein (2017), and very recently: Blumberg (2022a, b), Blumberg and Hawthorne (2022), and the references cited therein. As a reviewer observes, some of the analyses on the market do not fit the simple Kratzerian two-factor schema with modal bases and ordering sources, and thus any attempt of a uniform semantics for X-marking would have to be adjusted for the assumptions of those analyses. We do not engage with this here.

1992, following Karttunen, 1974) comes from presupposition projection, where it can be shown that presuppositions triggered in the complement of the desire ascription are projected to the belief set of the agent, rather than the context set or the speaker's epistemic set:

- (75) Patrick is under the misconception that he owns a cello, and he wants to sell it. (Heim, 1992)

So, we might say that the default value for D in (74) is the set of worlds compatible with x 's beliefs in w .⁵⁵

What would this mean for the analysis of X-marked desires? One option we can quickly dismiss is that just like in the case of conditionals where X marks that the domain is not entirely included in the epistemic set of the conversation, X on desire would mark that the domain (here: the agent's doxastic set) is not entirely included in the epistemic set of the conversation. This is not promising: an agent is likely to have *some* beliefs that are false (and hence not in any epistemic set) or disagree with the conversational context's assumptions. But then X should be virtually obligatory on desire ascriptions, which is not the case.

Much more promising is the idea that X-marked desires signal that the domain of the X-marked desire ascription is not entirely included in, that is, is wider than the default domain, that is, the agent's doxastic set. In other words, X would mark that worlds outside the agent's doxastic set are included in the quantified claim made by the desire ascription.

When the agent has a desire for a proposition p that they think is unattainable, the default D (their doxastic set) does not contain any p -worlds and therefore, the semantics in (74), with the default value for D , would predict that the desire ascription x *wants* p is straightforwardly false (or, worse, a presupposition failure, if we build in a presupposition that D contains p -worlds).

To construct an ascription of an unattainable desire, D then has to be wider than the agent's doxastic set. It needs to include some p -worlds.⁵⁶ Once these worlds have been added to D , the semantics in (74) can proceed and claim that in this widened set, the best worlds are in fact all p -worlds. The idea then would be that X-marking is a signal that such a widening from the default doxastic set is active.

Iatridou (2000) gave the following examples to show that X-marked desires indeed are associated with a signal about the agent's (and not the speaker's) belief set not containing p -worlds:

- (76) a. Arnold wishes he were married to exactly the type of woman he is married to but he doesn't know it.
 b. In the movie *True Lies*, Jamie Lee Curtis wishes she were married to an exciting person and she is.
 c. (Said by an expert on van Gogh:) Jean, who lives in Arles, wishes he lived in a place where van Gogh had spent some of his life. Poor Jean! He thinks that van Gogh was an Icelander who never left his island.

⁵⁵ A useful overview of other arguments for the belief-set relativity of desire is provided in Phillips-Brown (2021).

⁵⁶ Which p -worlds is a tricky question. See Grano & Phillips-Brown (2020) for some relevant discussion.

So, the idea we're pursuing is that X-marking on desires signals that the domain of quantification is wider than the agent's doxastic set, which is the default domain for desire ascriptions. But, while we find this picture very attractive, there are difficulties.

The first set of problematic cases are ones where the doxastic set consists entirely of worlds where the complement proposition is true, in other words: the agent believes that the complement is true. There are two observations to be made here:

- (i) Our semantics so far would predict that if the agent believes p , the agent thereby wants p , because all of the best worlds in their doxastic set will be p -worlds simply because *all* worlds in their doxastic set are p -worlds. This is wrong, as pointed out by Stalnaker (1984: p. 89): "Suppose I am sick. I want to get well. But getting well entails having been sick, and I do not want to have been sick."
- (ii) The flip side of this is that sometimes we do in fact want what we believe to be true, as shown by Iatridou (2000)'s example:⁵⁷

(77) I live in Bolivia because I want to live in Bolivia.

The utterer of (77) is making a contingent claim, not one that is trivially true.

Both of these observations show that O-marked wants must be able to look beyond the agent's doxastic set in order to take into account at least some non- p -worlds when the agent believes that p is true. The question is why there is no X-marking in these cases, in fact, why X-marking is not possible here. In other words, there is an asymmetry: widening to include worlds where an unattainable desire is satisfied can give rise to X-marking, while bringing worlds into the equation where a not desired alternative proposition is true (in the case of (77): worlds where you don't live in Bolivia) does not go with X-marking.

To maintain our basic idea that X-marking marks domain widening beyond the default, we need to add something to the story of how desire ascriptions work. One possibility is that in these cases, the domain is in fact still the doxastic set but that non- p -worlds outside the domain can be "looked at" without being added to the domain. Then, the domain doesn't need to be widened and we don't expect X-marking in these cases.⁵⁸ A perhaps better option is to say that the default domain always contains the

⁵⁷ Heim (1992) provides the following example:

(i) [John hired a babysitter because] he wants to go to the movies tonight.

This is acceptable even if John firmly believes he will go to the movies tonight. One difference between (i) and (77) is the obvious future orientation of Heim's babysitter example, which brings in interesting complications that we will not address here.

⁵⁸ Here is an attempt:

(i) $\llbracket \text{want} \rrbracket^w = \lambda p.\lambda x. \forall w' \in \text{BEST}_{(w,x)}(D_{(w,x)}): p(w') = 1 \ \& \ \neg \exists w'' \in \text{Sim}_{w'}(\neg p): w'' \leq w'$

Here, $\text{Sim}_{w'}(\neg p)$ returns the closest non- p worlds to w' . What happens in (i) is that in addition to our original requirement (that all the best worlds in the domain are p -worlds), we also require that those best p -worlds are better than any of the closest non- p worlds. But crucially, those non- p worlds don't have to be found in the domain. Comparison with non- p worlds in this analysis does not require widening of the domain. There would be a price to pay: unlike our original analysis in (74), the new analysis in (i) is not upward monotonic, which one of us tends to obsess about (von Fintel, 1999). Bringing non- p worlds into the comparison means that the "more upward" we go, the further out in the similarity ordering we may need

closest non- p -worlds even if they are outside the doxastic set. So, the default domain is $\text{DOX}^{+\text{not}-p}$. If the doxastic set already includes non- p -worlds, the default domain will be identical to the doxastic set. Otherwise, the default domain will be larger than the doxastic set. Since this would be built into the semantics, it is not domain widening, and thus X-marking is out of place, as we would want.

Under both of these proposals, expressing unattainable desires would still involve actual domain widening: if the doxastic set contains only non- p -worlds (the desire is believed to be unattainable), the domain will have to be widened to include p -worlds. And that is what X-marking signals. So far so good, if a bit intricate. But ...

The second problem for the idea that X-marking on desire predicates marks a widening of the domain beyond the default is that there are O-marked desire ascriptions with unattainable complements:

(78) I want this weekend to last forever.

The example in (78) is from Heim (1992). Given that it is known that no weekend can last forever, and given our idea about X-marking, we would expect that (78) would lose out to the *wish*-variant:

(79) I wish this weekend would last forever.

More precisely, if the difference between O and X-marking is a signal about whether the domain is widened beyond the default value of the doxastic set of the agent, why don't standard "Maximize Presupposition" considerations outlaw the use of the O-marked form?

Moreover, we find that both forms are acceptable even in transparent desire languages, like Greek:⁵⁹

- (80) a. *thelo afto to savatokiriako na kratisi ya panda*
 want this the weekend NA hold.NONPST.PRF for always
 'I want this weekend to last forever.'
- b. *tha ithela afto to savatokiriako na kratuse ya panda*
 FUT want.PST.IMP this the weekend NA hold.PST.IMP for always
 'I wish this weekend would last forever.'

So, we could say that O-marking does not by itself ensure that the domain has not been widened, but X-marking is only possible with a widened domain. For some reason, the expected competition that would result in an inference from O-marking to a non-widened domain can be obviated.

Finally, we would like to consider an idea that may be traceable to a remark in Heim (1992) about the forever weekend case, which she suggests "might be seen as

Footnote 58 continued

to go to find non- p worlds and thus we may find a disruption of upward inferences. We do not currently see a way to combine monotonicity with a semantics that does not widen the domain to include non- p worlds. All the more reason to take seriously the other option we will propose.

⁵⁹ As discussed in Footnote 45, there is also the option of having X on the desire and an O in the complement, which is used when the X-marking on 'want' is of the *exo-X* kind, signalling that we're talking about a desire in a counterfactual scenario but that the desire is attainable there.

reporting the attitudes of a mildly split personality. The reasonable part of me knows and is resigned to the fact that time passes, but the primitive creature of passion has lost sight of it.” What if a speaker who utters (78) rather than (79) is signaling that (at least temporarily) they are acting as if a forever weekend is actually attainable, perhaps willfully setting aside the harsh reality? In that case, the example is no longer a counter-example to a theory of O/X-marking that predicts that O-marking signals (via competition with X) that the default domain contains p -worlds. It’s just that the speaker is acting as if their doxastic set is bigger than their rational part would allow. This may prove the right idea in the end. It seems to us that discourse like (78) is not as felicitous in contexts where passionate desires are out of place but precision is required instead, such as in a court of law. But we leave this for another occasion.

We will leave things in this unresolved state and simply state that we hope that the “X marks widening beyond the default domain” idea will turn out to have legs.

Before we turn to our third case of X-marking, we need to note that the “past-as-past” approach does not fit well with the picture we have developed here for X-marked desires. In the case of conditionals, “past-as-past” gave a plausible account for how domain widening happens in X-marked conditionals: at prior points in time, the set of accessible worlds (under both metaphysical and epistemic accessibility relations) is strictly larger/wider than it is at later points. But this doesn’t carry over neatly to desire ascriptions. First, it’s not strictly true that beliefs evolve monotonically, with doxastic sets at time t_0 being subsets of those at a prior time t_{-1} : people non-monotonically revise their beliefs in the face of new observations. One might say that grammar idealizes away from this and assumes that belief sets behave just like epistemic sets. A second problem for the past-as-past approach: we can X-mark desires even if there is no prior time at which the agent believed the desire to be attainable. Consider:

(81) I wish I had never been born.

Surely, there is no time t_{-1} at which I believed that it was attainable that I wouldn’t be born.⁶⁰ A third problem: moving the evaluation point of a desire predicate into the past would not just move the determination of the domain (modal base) into the past, it would also move the time of the desire (the ordering source) into the past. But X-marked desires are not ipso facto about past desires.⁶¹

6.2 X-marked necessity

We turn to the prospects of extending the Stalnakerian insight to X-marked necessity modals. In von Fintel and Iatridou (2008), we proposed that X-marking in this case is a signal about ordering sources. A strong necessity modal (like *have to* or *must*) has (at most) one ordering source and choosing the weak necessity modal (whether

⁶⁰ The problem we’re pointing out here is reminiscent of one we’ve already mentioned in Sect. 3.2: some counterfactual conditionals countenance scenarios that at no point in the past were possible.

⁶¹ Robert Pasternak (p.c.) suggested to us that there may be a way of applying the past only to the modal base parameter of the desire predicate, but the details of such an idea would remain to be worked out. Khoo (2022: pp.235f) sketches a similar idea, and not just for X-marked desires but also for X-marked necessity. We are skeptical that this derives the correct readings. For X-marked necessity, we definitely don’t see how determining the modal base in the past achieves the effects we see with oughts.

lexicalized like *ought* or transparently X-marked) signals that a “secondary” ordering source is active. Consider for example:

(82) Everyone ought to wash their hands, employees have to.

We suggested that *have to* in (82) depends on what is required by health and safety regulations, while *ought* in addition brings in what’s best by not legally binding common-sense recommendations. Rubinstein (2012, 2014) further developed our rather vague ideas and proposed (in effect) that X-marking signals that the ordering is sensitive to more than non-negotiable priorities.⁶²

This is a point where the theory of X-marking has serious trouble to provide a unified analysis. If the ordering source-based account for X-marked necessity is on the right track, it is hard to see how to view this as domain widening, since the domain is unaffected. It is also difficult to see how “past-as-past” can apply in this case.

The only way towards unification that we see is to recast what X-marking signals to encompass both domain widening (in conditionals and desires) and ordering source addition (in necessity constructions). The common denominator is that in all three cases, there is a certain kind of departure from a default setting:

conditionals	X marks widening of the domain beyond the default (= context/epistemic set)
desire	X marks widening of the domain beyond the default (= doxastic ⁺ set)
necessity	X marks inclusion of priorities beyond the default (= non-negotiables)

Note that our earlier observation that X-marked necessity modals are “weakened” through X-marking while there is no sense in which X-marked desires are weak is captured by saying that X-marking targets different modal parameters in the two cases. An additional ordering source results in weakening, while a widened modal base does not.

7 After the prolegomena

These were the prolegomena, now comes the task of actually developing a full theory of X-marking. There is an excitingly vast to-do list.

7.1 To-do list

- For each specific language, we sketched what initial ground work needs to be done in Sect. 1.4 (“The project”).
- To assess the prospects of a unified meaning for X-marking, we need to fully understand the phenomena X-marking applies to. This is at least: conditionals, attitudes, modals, but also other uses of X-marking as discussed in Sect. 5.4. One

⁶² For work on weak necessity beyond von Stechow & Iatridou and Rubinstein, see the references in the very useful overview (Rubinstein, 2021), and especially Vander Klof & Hohaus (2020) and Silk (2022).

thing to keep in mind is that analyzing the interaction of these constructions with X-marking will probably not only help us understand X-marking but also shed light on the linguistics of these constructions.

- For conditionals, we listed some open questions in Sect. 3.4.
- For attitudes and modals, there are also many open questions. We only sketched the barest outlines of how to approach the semantic analysis of these constructions, let alone their interaction with X-marking.
- The issue of multiple (and possibly different) exponents of X-marking does not just arise with the antecedent versus consequent of conditionals, but also with X-marking on modal/attitudinal operators versus their complements. So, here as well, questions of effective versus reflective morphology will be relevant. Note that a “sequence of X-marking” approach would have to deal with the fact that some operators (like the Turkish *keşke*) trigger X-marking on their complement without (at least overtly) being X-marked themselves.
- The composition of X-marking (for example, from past tense, imperfective aspect, and/or subjunctive mood) needs to be explored. For the particular case of “fake past”, we saw some reasons to think that a past-as-past approach is unlikely to be applicable in all cases. But past-as-modal (or hybrid) approaches may be feasible.

7.2 Conclusion

We conclude by restating the core insight we would like to put on the research agenda: the morphosyntactic category of X-marking corresponds to a notional category of “departure from a default value of a modal parameter”.

We admit that we have no idea whether a formal implementation of this picture is in reasonable reach. We leave this as an open challenge. One significant part of this will be to explain how this meaning of X-marking is composed in the many languages where X-marking is not atomic (unlike the seemingly simpler case of Hungarian⁶³).

If the meaning of X-marking is “departure from a default value of a modal parameter”, why does it contain a past morpheme, an imperfective morpheme etc. in so many unrelated languages? The challenge of explaining the morphological composition of X will be formidable. If we are right about the contribution of X in the three different environments we have examined in this article, the task of explaining its compositional derivation will have to be on a quite different path than has been attempted so far, as the practice has been to explore X only in conditionals.

Our modest but, we believe, important point in this article was to show that studying X-marking in just one environment (conditionals) may give us a false sense of success and security. Once we broaden our attempts to understand X-marking in non-conditional environments, we see that all existing accounts fail. The past-as-past view appears to face serious difficulty. Maybe there is hope for the past-as-modal view.

Finally, it is of course possible that our ambition will be thwarted. Maybe it is correct that X-marking shows stable cross-linguistic tendencies of where it is used, but it may still be the case that the meanings it has in the different environments where it occurs cannot be unified. Future work will have to carefully assess with respect to

⁶³ But recall the proviso about Hungarian from Footnote 11.

specific languages whether a language-internal unified meaning can be shown to work and then whether those unified meanings are in fact the same cross-linguistically.⁶⁴

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⁶⁴ We thank a reviewer for pressing us on what it would take to argue for and against our picture.

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